

## AMENDMENTS TO THE CLAIMS

This listing will replace all prior versions, and listings of claims in the application.

### Listing of Claims:

Claims 1-5 (Previously Cancelled)

(Currently Amended) A cross-correlated signal processor comprising:

(a) means for cross-correlating a first input signal with a second input signal to generate cross-correlated in-phase (I) and quadrature-phase (Q) output signals adapted for Bit Rate Agile (BRA), cascaded mis-matched (ACM) Modulation-Demodulation (Modem) Format Selectable (MFS) and Code Selectable (CS) processing, the first input signal comprising a fraction or one or more than one symbol synchronous and/or asynchronous time constrained signal (TCS) response and cascaded long response (LR) filtered signal symbols of one or more input signals, and the second input signal comprising signal symbols of a quadrature-phase signal, the cross-correlated in-phase (I) and quadrature-phase (Q) output signals generated according to the following schedule:

(i) when the in-phase signal is zero, the cross-correlated quadrature-phase signal is close to the maximum amplitude normalized to one (1);

(ii) when the in-phase signal is non-zero, the ~~maximum~~ magnitude of the cross-correlated quadrature-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ;

(iii) when the quadrature-phase signal is zero, the magnitude of the cross-correlated in-phase signal is close to the maximum amplitude; and

(iv) when the quadrature-phase channel signal is non-zero, the magnitude of the cross-correlated in-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ;

(b) means for quadrature modulating the cross-correlated in-phase and quadrature-phase output signals to provide a cross-correlated quadrature modulated output signal, the means for quadrature modulating including a BRA, MFS and BRA filter set;

(c) controller and selector means for BRA rate, MFS and CS processor selection and Linear and/or Non-Linearly Amplified (NLA) baseband and/or quadrature modulated signal selection;

(d) coupling means for coupling the cross-correlated quadrature modulated output signal to a transmission medium;

(e) a BRA, MFS and CS quadrature demodulator;

(f) a receiver port for connection of the received cross-correlated signal to the BRA, MFS and CS demodulator; and

(g) a Mis-Matched (MM) demodulator filter set for BRA, MFS and CS in which a filter set of the quadrature demodulator is mis-matched to the filter set of the means for quadrature modulating.

[ Claims 7-42 (Previously Cancelled)

43. (Currently Amended) A cross-correlated signal processor comprising:

(a) a cross-correlator for cross-correlating a first input signal with a second input signal to generate cross-correlated in-phase (I) and quadrature-phase (Q) output signals adapted for Bit Rate Agile (BRA), cascaded mis-matched (ACM) Modulation-Demodulation (Modem) Format Selectable (MFS) and Code Selectable (CS) processing, the first input signal comprising a fraction or one or more than one symbol synchronous and/or asynchronous time constrained signal (TCS) response and cascaded long response (LR) filtered signal symbols of one or more input signals, and the second input signal comprising signal symbols of a quadrature-phase signal, the cross-correlated in-phase (I) and quadrature-phase (Q) output signals generated according to the following schedule:

(i) when the in-phase signal is zero, the cross-correlated quadrature-phase signal is close to the maximum amplitude normalized to one (1);

(ii) when the in-phase signal is non-zero, the ~~maximum~~ magnitude of the cross-correlated quadrature-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ;

(iii) when the quadrature-phase signal is zero, the magnitude of the cross-correlated in-phase signal is close to the maximum amplitude; and

(iv) when the quadrature-phase signal is non-zero, the magnitude of the cross-correlated in-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ;

(b) a signal modulator for quadrature modulating the cross-correlated in-phase (I) and quadrature-phase (Q) output signals to provide a cross-correlated quadrature modulated output signal, the signal modulator including a BRA, MFS and BRA filter set;

(c) a controller and selector for selecting: (1) at least one of or any combination of: BRA, MFS, and CS processors; (2) at least one of Linearly or Non-Linearly Amplified (NLA) baseband signals, or (3) at least one of linearly, non-linearly, or partially linearly and partially non-linearly amplified quadrature modulated signals;

(d) a first coupling for coupling the cross-correlated quadrature modulated output signal to a transmission medium;

(e) a second coupling for coupling a received cross-correlated quadrature modulated signal from the transmission medium to a receiver having a receiver port;

(f) a BRA, MFS, and CS quadrature demodulator;

(g) the receiver port for connection of the received cross-correlated quadrature modulated signal to the BRA, MFS, and CS demodulator; and

(h) a Mis-Matched (MM) demodulator filter set for BRA, MFS and CS in which the demodulator filter set is mis-matched to the BRA, MFS and BRA filter set of the signal modulator.

Claims 44-56 (Previously Cancelled)

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~~57.~~ (Currently Amended) The cross-correlated signal processor of Claim <sup>2</sup>~~43~~, wherein the cross-correlated signal processor is adapted to process (i) an in-phase signal component; and (ii) a quadrature-phase signal component; and

the in-phase and quadrature-phase signal components characterized in that: (i) when the in-phase signal is zero, the cross-correlated quadrature-phase signal is close to the maximum amplitude normalized to one (1); (ii) when the in-phase signal is non-zero, the ~~maximum~~ magnitude of the cross-correlated quadrature-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ; (iii) when the quadrature-phase signal is zero,

the magnitude of the cross-correlated in-phase signal is close to the maximum amplitude; and (iv) when the quadrature-phase channel signal is non-zero, the magnitude of the cross-correlated in-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ .

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38. (Currently Amended) A bit-rate agile (BRA) and modem format and code selectable ~~(MFS and CS)~~ <sup>cross-correlated</sup> signal pair comprising:

d Ins Pl  
d Ins M  
d  
an in-phase channel signal component; and

a quadrature-phase channel signal component;

the in-phase and quadrature-phase channel signals characterized in that:

(i) when the in-phase signal is zero, the cross-correlated quadrature-phase signal is close to the maximum amplitude normalized to one (1); (ii) when the in-phase signal is non-zero, the ~~maximum~~ magnitude of the cross-correlated quadrature-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ; (iii) when the quadrature-phase signal is zero, the magnitude of the cross-correlated in-phase signal is close to the maximum amplitude; and (iv) when the quadrature-phase channel signal is non-zero, the magnitude of the cross-correlated in-phase signal is reduced from 1 (normalized) to A, where  $0 \leq A \leq 1$ ;

and

the bit-rate agile (BRA) cross-correlated in-phase and quadrature-phase channel signal components are derived from at least one input signal stream as a fraction of a symbol or from one or more than one symbol as a time constrained signal (TCS) response and cascaded long response (LR) filtered signals. symbols.